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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte SIMON KNEE and RONALD S. PERLOFF

Appeal 2008-2648
Application 09/823,616¹
Technology Center 2100

Decided: January 27, 2009

Before: JAMES D. THOMAS, JAY P. LUCAS and STEPHEN C. SIU,
Administrative Patent Judges.

LUCAS, *Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF CASE

Appellants appeal from a final rejection of claims 1 to 32 under authority of 35 U.S.C. § 134. The Board of Patent Appeals and Interferences (BPAI) has jurisdiction under 35 U.S.C. § 6(b).

¹ Application filed March 31, 2002. The real party in interest is the Intel Corporation of California.

Appellants' invention relates to a method, machine and device for improving the speed of forwarding packets of information in routers, such as those used to convey information over the Internet. In the words of the Appellants:

"The networking community has adopted the Classless Inter-Domain Routing (CIDR) scheme in which addresses are allocated in contiguous blocks of any size that can be described as two taken to an integer power. Routers, which forward packets from one device to another, can save space in their routing tables by maintaining forwarding instructions for the address blocks rather than individual addresses. However, some difficulty arises in that, depending on the router's position within the network, it might have to treat some addresses within a block differently than the others." See Background of the Invention, page 2, lines 9-1 5

"Specifically, if an IP destination address matches more than one entry in the routing table, the router should forward the packet according to the forwarding instructions associated with the entry having the most "specific" matching routing table entry, e.g., the "longest match" or the "best prefix match." An IP address comprises a portion identifying a network prefix and a portion identifying a host number. An IP address with a longer network prefix describes a smaller set of destinations and is said to be more specific than an IP address with a shorter network prefix. Therefore, when forwarding traffic, a network device must choose the entry with the longest matching network prefix. The length of an entry's network prefix may be identified by a length attribute or by a "mask" associated with the entry." See Background of the Invention, page 2, line 20 to page 3, line 3.

(App. Br. 4).

Claim 1 is exemplary:

1. A method of performing a longest match search comprising:

receiving a search key, including an address;
retrieving an encoded mask vector from a mask table, the encoded mask vector corresponding to an address of the search key;
determining a set of masks using the encoded mask vector that when applied to the search key are known to have a potential for matching an entry in a routing table;
forming a routing table query based upon the search key and a mask of the set of masks, indicated by the encoded mask vector to be the longest mask of the set of masks; and
applying the routing table query to the routing table.

PRIOR ART

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Hunter	2002/0059197 A1	May 16, 2002
Hunter	6,223,172 B1	Apr. 24, 2001

Patent Publication 2002/0059197, used as the prior art to reject the claims, is a continuation of application 09/107,039 filed on June 29, 1998, now a patent 6,223,172. All the limitations contained in 2002/0059197 are present in 6,223,172 B1 filed on June 29, 1998. (Ans. 3).

REJECTIONS

Claims 1 to 32 stand rejected under 35 U.S.C. § 102(e) for being anticipated by Hunter.

The claims have been argued together, and will be treated as a whole. Appellants contend that the claimed subject matter is not anticipated by Hunter for failure of that reference to teach claimed limitations. The Examiner contends that each of the claims is properly rejected.

Rather than repeat the arguments of Appellants or the Examiner, we make reference to the Briefs and the Answer for their respective details. Only those arguments actually made by Appellants have been considered in this opinion. Arguments which Appellants could have made but chose not to make in the Briefs have not been considered and are deemed to be waived.

We affirm the rejection.

ISSUE

The issue is whether Appellants have shown that the Examiner erred in rejecting the claims under 35 U.S.C. § 102. The issue turns on whether Hunter teaches the mask table that contains encoded mask vectors used in the manner claimed.

FINDINGS OF FACT

The record supports the following findings of fact (FF) by a preponderance of the evidence.

1. Packets of information in a network are forwarded to their destinations by routers. (Spec. ¶ [0025]) Packets enter the router via an ingress port, and should be sent out of the router through the egress port that will best send it close to the destination address. (*Id.*). Routing tables in the router have the information necessary to decide which egress port should be used for which destination in the network. Appellants have invented a device and method for a router to quickly identify the entry in a router's routing table that best corresponds to the destination address, as specified in an incoming packet (i.e. search key), for forwarding the packet out through a port that will bring it closest to its destination. (*Id.* ¶ [0003]). The selection of the address depends on fast address matching of the

search key from the packet to an entry in the routing table, to find the “forwarding instructions associated with the entry having the most ‘specific’ matching routing table entry, e.g., the ‘longest match’ or the ‘best prefix match’.” (*Id.* ¶ [0005]). To preclude wasting time with fruitless searches for a match, digital masks, in the form of encoded mask vectors, are used to concentrate the search on as many significant digits of the address as required to make a good match. (*Id.* ¶ [0018]). The longest match for an address is efficiently identified by querying the routing table with progressively more significant bits of the address, using progressively smaller masks as necessary to make a match. (*Id.* ¶¶ [0019]-[0020]). Thus the routing table entries, suitably masked by masks from a mask table, indicate the port through which the packet should egress the router. (*Id.* ¶ [0027]). Routing table entries also indicate forwarding instructions for the address. (*Id.*).

2. The Hunter reference also is directed to quickly forwarding a packet in a router by “identifying a longest matching prefix of a given address in a forwarding database, a routing table, or the like.” (Hunter, ¶ [0004]). A packet “is received at a port. An address is extract from the data. A forwarding database is searched for a longest match for the address by comparing a portion of the address indicated by a mask to entries in the forwarding database and progressively shortening the mask based upon the address until a matching entry is located.” (*Id.* ¶ [0018]). Multiple shorter masks are used until a match is found. (*Id.* ¶ [0033]). A hash table in the router includes the address records, which are the forwarding database entries. Entries in the hash table records are clumped in “bins”

and are ordered from longest mask to shortest mask, to assure the first match is with the longest mask. (*Id.* ¶ [0054]).

PRINCIPLES OF LAW

Appellants have the burden on appeal to the Board to demonstrate error in the Examiner's position. See *In re Kahn*, 441 F.3d 977, 985-86 (Fed. Cir. 2006).

"In reviewing the examiner's decision on appeal, the Board must necessarily weigh all of the evidence and argument." *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992).

In rejecting claims under 35 U.S.C. § 102, "[a] single prior art reference that discloses, either expressly or inherently, each limitation of a claim invalidates that claim by anticipation." *Perricone v. Medicis Pharm. Corp.*, 432 F.3d 1368, 1375 (Fed. Cir. 2005) (citation omitted).

"Anticipation of a patent claim requires a finding that the claim at issue 'reads on' a prior art reference." *Atlas Powder Co. v. IRECO, Inc.*, 190 F.3d 1342, 1346 (Fed Cir. 1999) "In other words, if granting patent protection on the disputed claim would allow the patentee to exclude the public from practicing the prior art, then that claim is anticipated, regardless of whether it also covers subject matter not in the prior art." (*Id.*) (internal citations omitted).

This court has held in a number of decisions that a United States patent speaks for all it discloses as of its filing date, even when used in combination with other references. *In re Zenitz*, 333 F.2d 924, 926 (CCPA, 1964) (internal citations omitted).

ANALYSIS

From our review of the administrative record, we find that Examiner has presented a prima facie case for the rejection of Appellants' claims under 35 U.S.C. § 102(e). The prima facie case is presented on pages 3 to 8 of the Examiner's Answer. In opposition, Appellants present a number of arguments.

*Arguments with respect to the rejection
of claims 1 to 32
under 35 U.S.C. § 102.*

Appellants contend that Examiner erred in rejecting representative claim 1 because “[t]here is no suggestion in Hunter of using a mask table that contains encoded mask vectors, nor of using an encoded mask vector when applying a search key to a routing table.” (App. Br. 11, middle). Appellants agree with the Examiner that Hunter compares the search key with the entries in the forwarding database (*Id.*, bottom). However, Appellants argue that Claim 1 requires “retrieving an encoded mask vector from a mask table”, and assert that Hunter does not perform that step.

Examiner points to paragraph [0061]. By that paragraph, the search key is extracted, and then masked for comparison searching with the entries in the hash table. (*See* Hunter, Figure 5, Table #550). The hash table #550 is divided into bins containing the address records, which are the forwarding database entries. (*Id.* ¶ [0054], 1. 5). The entries in each bin are masked with masks of different lengths. (*Id.*, 1. 10). The “encoding” for the encoded mask vector has not been specified in the claim. Processing through a hash generator is a type of encoding, and the claim can be broadly and fairly read on hash encoding. The portion of the hash table identified by the hash index

(that is, the hash bin) is search for a masked entry matching the masked search key at step 630. (*Id.* ¶ [0061], l. 10). A comparison is made (step #640), and then in Hunter's step #650 if no match is found, the mask is shortened to a shorter mask (step #660) and the comparison is repeated (at B, in Fig. 6).

The Examiner, in pointing to paragraph [0061], is reading the claimed "retrieving an encoded mask vector from a mask table" as Hunter's retrieval from the masked entries in the bins of the Hash Table of the different levels of masking as embodied in the process of steps #630 to #660. Retrieval is performed at one mask level, and if no successful match is made, retrieval at another shorter mask level is tried. This is a broad, but not unreasonable reading of the limitation, as explained above, and we decline to find error in the rejection on this point.

Appellants next argue that "Hunter does not determine a set of masks and does not use an encoded mask vector. Hunter generates a hash index using one mask. If there is no match, then step 660 shortens that same mask and generates another hash index (step 620) and so on until a mask is found." (App. Br. 12). Appellants' contention has been considered. However, as noted above, the claimed encoding is being read on the hash process as taught by Hunter. Hashing generates a shorthand code representative of the original unencoded number. Also, contrary to the Appellants' assertion, (*Id.*) we find a "shortened mask" to be a different mask from the original longer mask. Thus the set of different length masks on the entries is read as the claimed "set of masks".

Appellants' remaining arguments, on page 12 of the Brief, are variations of the issues discussed above. The claimed query is inherent in

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the process of selection and retrieval of an entry from the bin, #640. We do not find the Appellants to have established error in the Examiner's rejection over Hunter.

CONCLUSION OF LAW

Based on the findings of facts and analysis above, we conclude that the Examiner did not err in rejecting claims 1 to 32 under 35 U.S.C. § 102 over Hunter.

DECISION

The Examiner's rejection of claims 1 to 31 for being anticipated by Hunter is Affirmed.

AFFIRMED

msc

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